



# AIR-COOLED CHILLERS

Heat recovery chillers



APPLIED SYSTEMS

R-407C



[www.daikin.eu](http://www.daikin.eu)

EWTP110-540MBYN

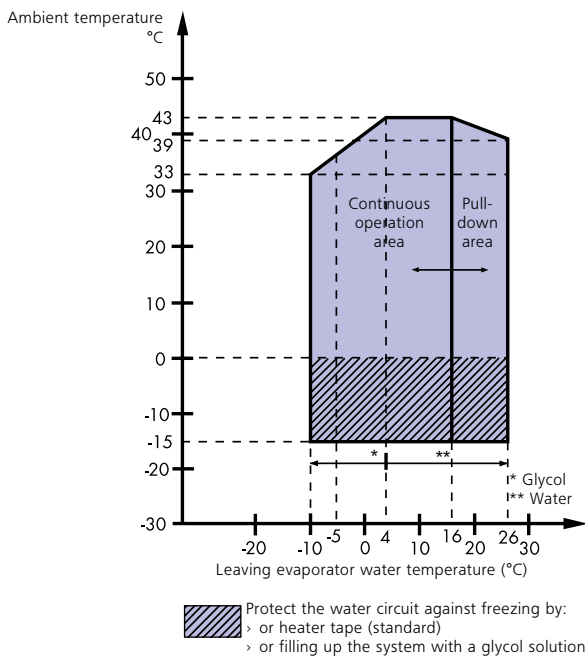
HEAT RECOVERY



# ENVIRONMENTAL AWARENESS

## Daikin and the Environment

In recent years, motivated by a global awareness of the need to reduce the burdens on the environment, some manufacturers including Daikin have invested enormous efforts in limiting the negative effects associated with the production and the operation of chillers. Hence, models with energy saving features and improved eco-production techniques have seen the light of day, making a significant contribution to limiting the impact on the environment.



## FLEXIBLE APPLICATION



In many applications there often exists a simultaneous cooling and heating demand requirement alongside one another. To benefit from this Daikin offers the full range of R-407C EWTP110-540MBYN chillers with the option of heat recovery. This option further increases the application flexibility and extends possibilities in the hotel and leisure industry as well as the industrial and process sectors.

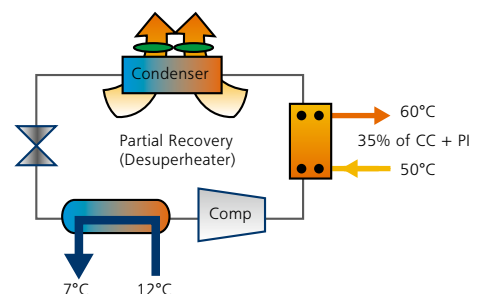
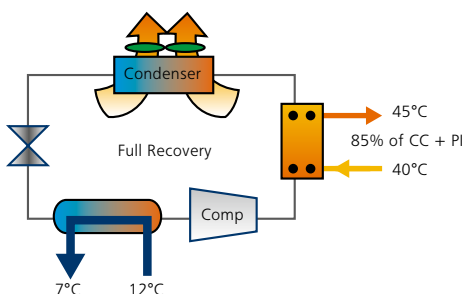
By energetically recovering useful heat from the cooling cycle that would otherwise be rejected to outside, COPs of up to 5.73 can be realised in heat recovery mode. The heat recovery unit aims to achieve an optimum balance between cooling and heat recovery to maximize the unit efficiency and offer savings in hot water production.

## HEAT RECOVERY CONCEPT

An additional stainless steel brazed plate heat exchanger is mounted in series between the compressor and air-cooled condenser. Depending on the temperature requirement for the hot water production this exchanger will act either as a desuperheater for partial heat recovery (30%) or as a condenser for full heat recovery (85%).

As a desuperheater the sensible heat from the hot discharge gas will be recovered, while the latent heat exchange will occur in the air-cooled condenser. The units efficiency is maintained as condensing pressure can be reduced due to air-cooled condenser becoming oversized. Hot water temperatures up to 70°C can be achieved.

For full heat recovery both sensible and latent heat exchange will occur in the recovery exchanger. Inverter fans will be used to control the recovery outlet water temperature, by throttling back the airflow and maintaining the required condensing temperature.



# HEAT RECOVERY CONTROL

A heat recovery unit must operate at high condensing temperature to have a high amount of heat recovered. Operation at high condensing temperature penalizes chiller efficiency due to the higher power input required.

A conventional unit has no temperature control on the hot water side and will operate at a fixed high condensing temperature. Even during periods of no or low heat request, the unit will remain operating at high condensing pressure, reducing unit efficiency.

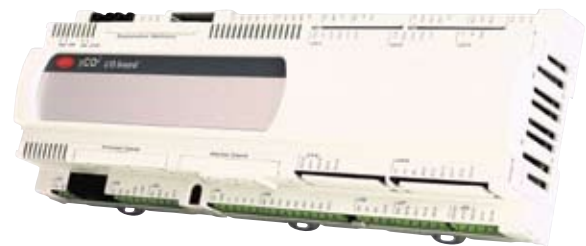
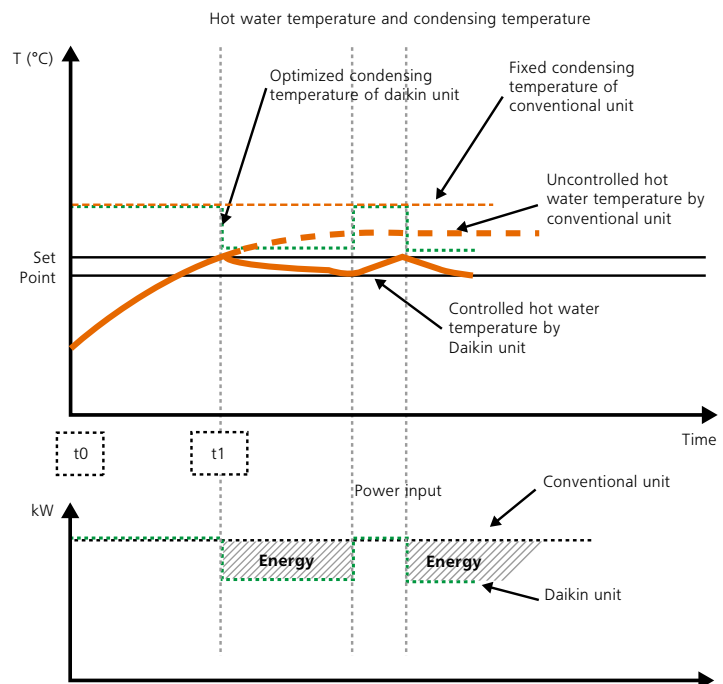
The Daikin heat recovery unit can be equipped with a control on the hot water temperature. Thanks to its inverter driven fans, it will be able to change its target condensing temperature depending on whether there is heat requested or not. If there is no heat requested, the unit will operate in 'cooling mode' and the condenser fans will run at higher speed as to lower the condensing pressure. If there is heat requested, the unit will operate in 'heat recovery' mode and the fans will run at lower speed as to achieve a higher condensing temperature. In this way, the condensing pressure is optimized for highest efficiency at all times.

Explanation:

From  $t_0$  to  $t_1$  there is a lot of heat requested. Both the Daikin unit and the conventional unit run at high condensing temperature. In point  $t_1$  the required hot water temperature is reached.

At this moment, the conventional unit will keep operating at its fixed condensing temperature even if the heat demand is low. The hot water temperature will keep rising until the temperature difference with the condensing temperature is so low that no heat is anymore transferred to the water.

The Daikin unit however will, once the required hot water temperature is reached, reduce its condensing pressure. The power input of the unit is reduced and the water is not unnecessary heated. Compared to the conventional unit, this will result in major energy savings.



# ELECTRONIC CONTROL

Units fitted with heat recovery are compatible with the Daikin Integrated Chiller Network. DICN enables any 4 chillers of similar or different sizes, to operate simultaneously as if they were a single unit. By giving priority to the heat recovery unit, generation of hot water is reliable at part load conditions.

Thanks to the standard DICN, simultaneous operation of up to 4 chillers is allowed.

This function enables a Daikin 2MW chiller plant to be operated via a single controller.



Heat recovery			110	140	160	200	280	340	400	460	540	
Capacity	Cooling	kW	107.00	138.00	158.00	191.00	274.00	335.00	379.00	449.00	520.00	
	Cooling during heat recovery	kW	97.70	126.00	144.00	171.00	251.00	311.00	337.00	401.00	465.00	
	Heat recovery	kW	116.00	148.00	176.00	208.00	301.00	377.00	407.00	434.00	441.00	
Nominal input	Cooling	kW	43.70	54.00	67.00	81.30	113.00	146.00	163.00	197.00	232.00	
	Heat recovery	kW	39.40	47.80	62.40	73.20	103.00	132.00	142.00	177.00	214.00	
Heat recovered		%	85	85	85	85	85	85	85	75	65	
EER			2.45	2.56	2.36	2.35	2.42	2.29	2.33	2.28	2.24	
COP			5.44	5.73	5.13	5.17	5.36	5.21	5.24	4.71	4.24	
Capacity Steps		%	30-100 (stepless)						15-100 (stepless)			
Dimensions	(Height x Width x Depth)	mm	2,250x2,346x2,238				2,250x4,280x2,238			2,250x5,901x2,238		
Unit		kg	1,465	1,629	1,723	2,266	2,646	2,727	4,990	5,113	5,236	
Operating Weight		kg	1,483	1,654	1,752	2,299	2,692	2,784	5,090	5,220	5,350	
Water Heat Exchanger	Type		Brased plate, one per circuit									
	Minimum water volume in the system	l	520	680	770	930	1,340	1,640	930	1,100	1,270	
	Water flow rate	Min	l/min	160	205	235	285	410	500	565	670	775
Max		l/min	640	825	940	1,140	1,640	2,000	2,265	2,680	3,100	
Air heat exchanger	Type		Cross fin coil/Hi-X tubes and chromate coated waffle louvre fins									
Sound Power	Cooling	dB(A)	89	94	95	96	98	99				
Compressor	Type		Semi-hermetic single screw compressor									
	Model	Quantity	1									
Refrigerant circuit	Refrigerant type		R-407C									
	Refrigerant charge	kg	32.0	46.0	49.0	70.0	110.0	79.0	80.0			
	No of circuits		1						2			
	Refrigerant control		Thermostatic expansion valve									
Operation range	Air side	°C	-15°C ~ 43°C									
	Water side	°C	-10°C ~ 26°C									
Power Supply			3~/400V/50Hz									
Piping connections	Evaporator water inlet/outlet		Flexible coupling + counterpipe for welding 3"OD			Flexible coupling + counterpipe for welding 3"			Flexible coupling 5"			
	Heat recovery condenser inlet/outlet		2"G									
	Evaporator water drain		Field installation				1/4"G					

Notes:

- Nominal cooling capacity at Eurovent conditions: evaporator 12°C/7°C, ambient 35°C
- Nominal cooling power input at Eurovent conditions: evaporator 12°C/7°C, ambient 35°C
- Minimum required water volume for standard thermostat settings and at nominal conditions
- Nominal cooling capacity and heat recovery capacity during heat recovery mode according to EN14511
- Values between brackets including installation space of delivered filter

Option Number	Option description	Unit size										
		110	140	160	200	280	340	400	460	540	Availability	
<b>Completely combinable options</b>												
OP03	Dual pressure relief valve	o	o	o	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	Factory mounted
OP12	Suction stop valve	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	Factory mounted
OP52	Main isolator switch	o	o	o	o	o	o	o	o	o	o	Factory mounted
OP57	A-meter / V-meter	o	o	o	o	o	o	o	o	o	o	Factory mounted
OPLN	Low noise operation	o	o	o	o	o	o	o	o	o	o	Factory mounted
OPCG	Condenser protection grilles	o	o	o	o	o	o	o	o	o	o	Factory mounted
<b>Available kits</b>												
EKCLWS	Leaving water control sensor for DICN	o	o	o	o	o	o	o	o	o	o	Kit
EKAC200A	BMS card	o	o	o	o	o	o	o	o	o	o	Kit
EKBMSMBA	BMS gateway modbus / j-bus protocol	o	o	o	o	o	o	o	o	o	o	Kit
EKBMSBNA	BMS gateway bacnet protocol	o	o	o	o	o	o	o	o	o	o	Kit
EKRUPC	Remote user interface	o	o	o	o	o	o	o	o	o	o	Kit

To install EKBMSMBA, EKBMSBNA --> EKAC200A needs to be installed on the unit

o available  
(s) option required for Swedish national law SNFS 992:16



Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intention to become a leader in the provision of products that have limited impact on the environment.

This challenge demands the eco design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.



Daikin Europe N.V. is approved by LRQA for its Quality Management System in accordance with the ISO9001 standard. ISO9001 pertains to quality assurance regarding design, development, manufacturing as well as to services related to the product.



ISO14001 assures an effective environmental management system in order to help protect human health and the environment from the potential impact of our activities, products and services and to assist in maintaining and improving the quality of the environment.



Daikin units comply with the European regulations that guarantee the safety of the product.



Daikin Europe N.V. participates in the Eurovent Certification Programme for Air Conditioners (AC), Liquid Chilling Packages (LCP) and Fan Coil Units (FC); the certified data of certified models are listed in the Eurovent Directory. Certification is valid for air cooled models <600kW and water cooled models <1500kW.

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